



Arab Academy
for Science Technology & Maritime Transport

The International Maritime
Transport and Logistics Conference


“Marlog 11”

**ENVIRONMENTAL SUSTAINABILITY OF
COASTAL AREAS AND
BUILDING-WITH-NATURE
10 years of experience in a Dutch project**

Frank van der Meulen
Netherlands
Delft & WMU



Towards a SUSTAINABLE **BLUE**
ECONOMY
20 - 22 March, 2022
Hilton Green Plaza Hotel



Building with nature
(use natural elements and processes)

Nature compensation

Ecology of coastal dunes

2010



- Extension harbor Rotterdam in coastal zone (1500ha)
- EU protected high quality ecology

- Dune damage ●
- EU: Dune compensation (also marine compensation) ●

2011

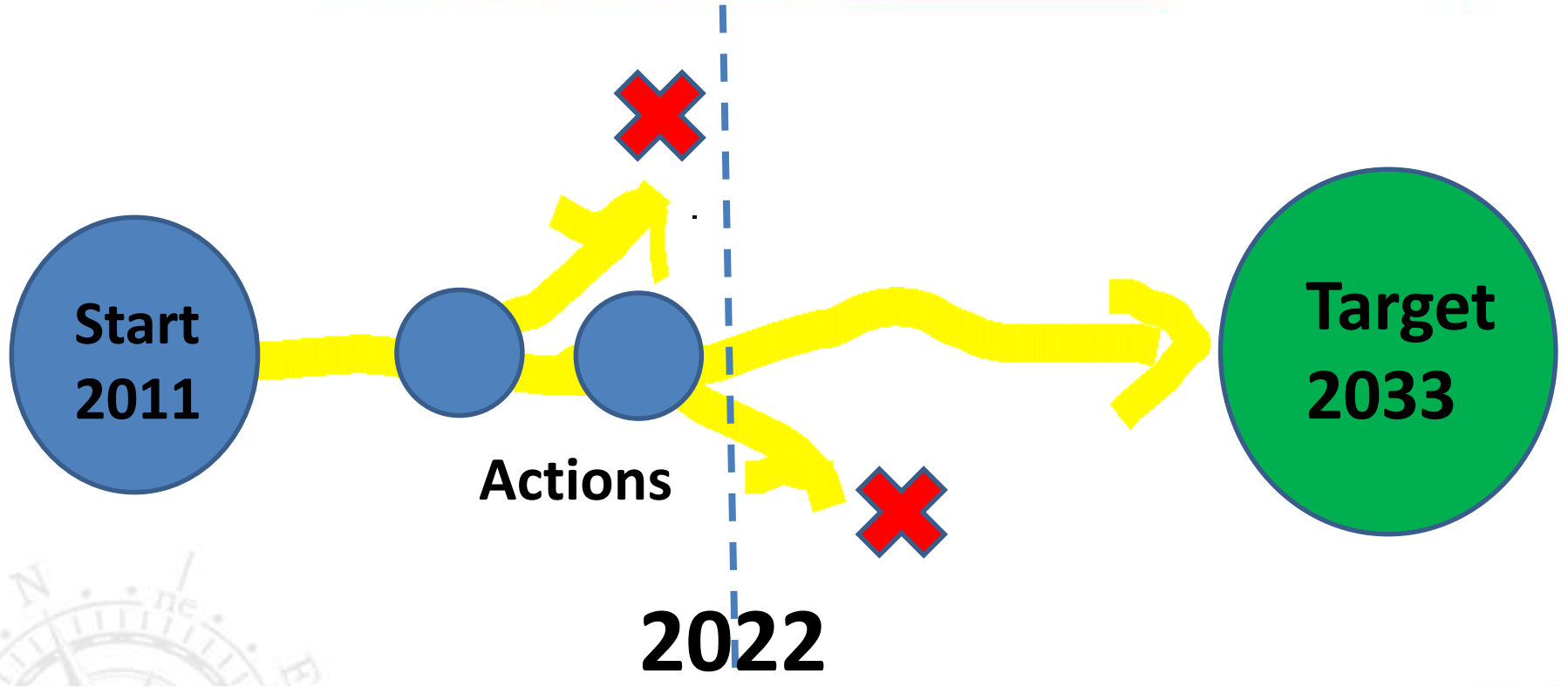
- Nature compensation, 35ha
- Nourishment, 6 mln m³ sand, North Sea bottom
- Building with nature



Dune marsh (5-10)



Grey dune (>20)



2022

Actions

Start
2011

Target
2033

Nature development takes time:
monitor, evaluate, take actions

- Building with nature.....How did it go?
- 2011-2021 first balance after 10 yrs experience
- Give nature a hand at three important ecological levels

DYNAMICS AND MORPHOLOGY

Too much wind and sand blasting for plants to settle

Reduce dynamics



GROUNDWATER

Too few moist areas for Dune marsh to grow

Excavate deeper



VEGETATION

Too less seed bank in soil for plants to settle

Bring seeds from elsewhere



- Reduce sand blasting
- Stop wind / sand dynamics
- Stabilize soil surface



2017

DYNAMICS AND MORPHOLOGY



2019

Excavate

Create more moist
habitats



moist soil for dune marsh

GROUNDWATER





Orchid

2020 Seeds from high quality vegetation elsewhere

VEGETATION



After 10 years BwN (2011-2021)

- Habitat conditions now **good** for compensation success
- Nature** needs time (decades), more than **politicians** have (1-4yrs)

Lessons

- Always **compensate** to aim at sustainable coast
- Consider BwN as **alternative** for traditional hard solutions
- Nature sometimes **not** predictable and makable
- BwN needs **helping hand**
- Monitor and evaluate** to know what / when to do
- Learn by doing** to use more green technology in future

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Thank you

Environmental sustainability of coasts





Hard
Environmental not friendly
Building IN/AGAINST nature
Civil engineering



Soft
Environmental friendly
Building WITH nature (use local elements, processes)
Nature engineering

Developments in coastal defence engineering, past 10 years